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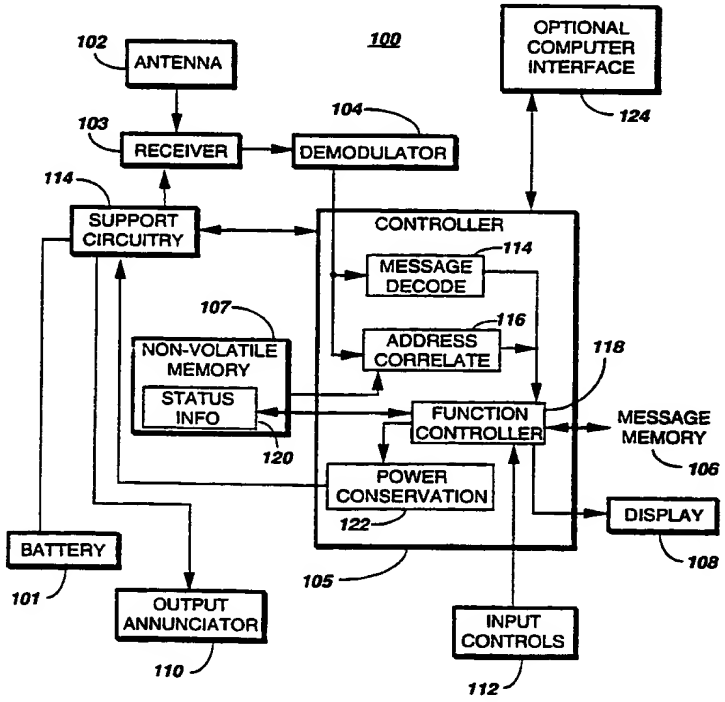
(54) Title: SELECTIVE CALL RECEIVER HAVING USER SELECTABLE ADDRESSES AND FUNCTIONS

(57) Abstract

A selective call receiver (100) can receive address information and associated message information. An address memory (107) stores at least one predetermined address and associated status information (120) including an enabled or disabled address status (204). An address correlator (116) correlates the received address information to the at least one predetermined address. The selective call receiver (100) can determine from the status information (120) associated with the at least one predetermined address that correlated with the received address information whether a status of the received address information is an enabled or disabled address status (204). A message decoder (114) decodes the associated message information when the status of the received address information is enabled, and does not decode the associated message information when the status of the received address information is disabled.



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SELECTIVE CALL RECEIVER HAVING USER SELECTABLE ADDRESSES AND FUNCTIONS

Field of the Invention

This invention relates generally to selective call receivers, and more particularly to a method and apparatus for enabling and disabling addresses and functions in a selective call receiver.

Background of the Invention

A conventional selective call receiver, e.g., a pager, often can receive messages from more than one source. Sources are distinguished from each other typically by address information associated with each message. When the address information correlates, or matches, predetermined address information in the selective call receiver, the selective call receiver presents an alert to a user to indicate the reception of a message from the particular source. In an audible mode, each predetermined address information, i.e., each source, invokes an audible alert having a cadence, or pattern, that is distinguishable from other predetermined address information, i.e., other sources. That is, a user can distinguish messages received from different sources by the cadence of the audible alert. In the silent mode, a vibratory or silent alert of a predetermined duration indicates the reception of a message to a user. Typically, a contemporaneous visual alert, such as a blinking lamp or light emitting diode (LED), may identify the particular source. Optionally, a visual indicator on a display may provide the visual alert for identifying the particular source. This method of receiving and presenting messages, and identifying sources, to the user is well known in the art.

The predetermined address information in the selective call receiver is normally pre-configured by the service center or the manufacturer. Hence, the predetermined address information is normally fixed and unchangeable by the user. Likewise, the particular alert cadence associated with the predetermined address information is also fixed and unchangeable by the user. Normally, the user can only select the type of alert desired, e.g., audible alert or silent alert, for the entire selective call receiver. Typically, the user enters the selection via user controls in the selective call receiver.

With the advent of modern paging services, capable of sending continuously repeating information pages to the selective call receivers, a user may be subjected to repeated and unwanted pages. For example, stock market, weather, sports, or other information may be periodically sent to a subscribing pager. Each received page then alerts the user to indicate the reception of the message. The address information associated with the message sent by an information paging services identifies the source as discussed above. A user can distinguish between an information service page and pages from other sources, e.g., from the office or from home, similarly as discussed above.

Regrettably, the alerts from the continuously repeating information pages can be very annoying to a user. Further, although unwanted by the user, these alerts may be unavoidable using conventional selective call receivers. That is, these alerts cannot be selectively disabled while allowing alerts from other sources. Hence, the user accepts alerts from all sources or from none.

For example, in a business meeting, the user normally does not want to be bothered by alerts from an update on weather information. On the other hand, pages from other sources, such as from home or the office, may be much more important and requiring immediate attention. Hence, the user can avoid the annoying continuously repeating weather

updates by turning the pager off, at the expense of indiscriminately missing all pages from all sources. More often, the user may tolerate the unwanted repeated alerts to be able to receive the other more important messages. Even if the user put the selective call receiver in a silent mode, the continuously repeating information service pages would continue to be an unavoidable frustration, because the user would still have to take some action to determine the respective source of the pages.

Additionally, the repeated and unwanted pages can accelerate the depletion of the selective call receiver's power source, e.g., the battery. Besides monitoring for and decoding address information, the selective call receiver normally performs the following additional functions: 1) decode the message information, 2) store the decoded message information in memory, and 3) alert the user of the reception of the message. These additional functions consume additional power from the power source, and the continuously repeating pages therefore significantly accelerate the depletion of the power source.

Furthermore, the repeated and unwanted pages typically consume precious memory in the selective call receiver which can be used for receiving and storing messages from the more important sources. In some selective call receivers, when memory is completely full with messages, newly arriving messages typically displace older stored messages. Hence, when the user is not able to read messages within a short time from when they were received, the repeated and unwanted pages may cause an interim important message to be deleted from memory before the user has read it. In certain circumstances, an emergency page may be lost due to the repeated and unwanted pages, resulting in serious consequences.

Thus, a user may require a selective call receiver that is more user configurable than what is available today. What is necessary is a method and apparatus for

allowing the user to selectively enable and disable addresses and functions in a selective call receiver.

Summary of the Invention

In carrying out one form of this invention, there is provided a selective call receiver comprising receiving means for receiving address information and associated message information. Further, the selective call receiver comprises address memory means for storing at least one predetermined address and associated status information comprising an enabled or disabled address status, and address correlating means, coupled to the receiving means and the address memory means, for correlating the received address information to the at least one predetermined address. Additionally, the selective call receiver comprises status determining means, coupled to the address correlating means and the address memory means, for determining from the status information associated with the at least one predetermined address that correlated with the received address information whether a status of the received address information is an enabled or disabled address status, and message decoding means, coupled to the status determining means and the receiving means, for decoding the associated message information when the status of the received address information is enabled, and for not decoding the associated message information when the status of the received address information is disabled.

Brief Description of the Drawings

FIG. 1 shows a block diagram of a selective call receiver according to a preferred embodiment of the present invention.

FIG. 2 illustrates an address and status information table in memory for the selective call receiver of FIG. 1, according to the preferred embodiment of the present invention.

FIGs. 3, 4, and 5 constitute a flow diagram for configuring status information for the selective call receiver of FIG. 1, in accordance with an embodiment of the present invention.

FIG. 6 is a flow diagram illustrating an operational sequence for the selective call receiver of FIG. 1, according to an embodiment of the present invention.

Description of a Preferred Embodiment

FIG. 1 shows a block diagram of a selective call receiver, e.g., a paging receiver 100, according to a preferred embodiment of the present invention. The selective call receiver 100 is powered by a battery 101 and operates to receive a radio frequency signal via an antenna 102. A receiver 103 is coupled to the antenna 102 to receive the radio frequency signal. A demodulator 104 is coupled to the receiver 103 to recover any information signal present in the radio frequency signal using conventional techniques. The recovered information signal from the demodulator 104 is coupled to a controller 105 which decodes the recovered information in a manner well known to those skilled in the art.

In the preferred embodiment, the controller 105 comprises a microcomputer, such as a Motorola, Inc. manufactured microcomputer, e.g., MC68HC05C4, and has a signal processor performing the function of a decoder, which is normally implemented in both hardware and software. The signal processor comprises an address correlator 116 and a message decoder 114, using methods and techniques known to those skilled in the art. The address correlator 116 checks the recovered information signal from the output of the demodulator 104 for address information and correlates a recovered address information with a predetermined address information that is usually stored in the selective call receiver's non-volatile

memory 107. When the recovered address information correlates with the predetermined address information, and in accordance with status information 120 also stored in the non-volatile memory 107, the function controller 118 invokes the message decoder 114 to decode the message information that is associated with the correlated address information.

Specific status information for each predetermined address information stored in the non-volatile memory 107 is organized in an address and status table in the non-volatile memory 107. The status information associated with each predetermined address indicates to the function controller 118 whether the particular predetermined address information is currently enabled or disabled, and additionally what function or functions in the selective call receiver to invoke in response to correlating address information to an enabled predetermined address. In the preferred mode, recovered address information that correlates with an enabled predetermined address information causes the function controller 118 to invoke the message decoder 114 to decode the message information and further to store the decoded message information in message memory 106. In this way, a user of the selective call receiver 100 can retrieve stored messages during normal use, while the selective call receiver typically only decodes messages that are associated with enabled predetermined addresses. Advantageously, this conserves power from the battery 101, because the message decoder 114 is only invoked with an enabled predetermined address detection, and the message is stored in message memory 106 likewise when the predetermined address is enabled. Further, the status information 120 associated with the predetermined address information in the non-volatile memory 107 can be modified by a user, as will be more fully discussed below.

After receiving, decoding, and storing the message information in message memory 106, the selective call

receiver 100 typically presents at least a portion of the stored message to a user, such as by a display 108, e.g., a liquid crystal display. Additionally, along with receiving, decoding, and storing the message, an alert is presented to the user via an output annunciator 110. The alert can include an audible alert, a visual alert, a vibratory or silent alert, or a combination of the aforementioned alerts, using known methods and techniques.

An optional computer interface 124 provides an alternative means of communicating received messages to a user. Using conventional computer communication protocols, such as an RS-232 or an RS-422 protocol, the controller 105 can send control information and message information to an external computer, or other device. Likewise, control information and message information from an external computer can also be received by the controller 105 in the selective call receiver 100. Hence, the selective call receiver 100 can interface with an external computer, such as a notebook or palm top computer, providing a messaging interface to the external computer. A received and decoded message information associated with address information matching a predetermined address, may be stored in message memory 106 and also communicated via the computer interface 124 to an external computer, or other device.

A support circuit 114 preferably comprises a conventional signal multiplexing integrated circuit, a voltage regulator and control mechanism, a current regulator and control mechanism, audio power amplifier circuitry, control interface circuitry, and display illumination circuitry. These elements are arranged to provide support for the functions of the selective call receiver 100 as may be requested by a user.

Additionally, the function controller 118 can determined from the enabled or disabled status information 120 in the non-volatile memory 107 whether to conserve power upon detection of an address information. That is,

when a received and recovered address information correlates with a predetermined address in the non-volatile memory 107 the function controller 118 checks the status information corresponding to the correlated predetermined address information to determine whether that address is enabled. If the function controller 118 determines that the correlated predetermined address is not enabled then the message decoder 114 is not invoked. Further, the function controller 118 signals a power conservation module 122 to begin conserving power for the selective call receiver 100. The power conservation module 122 signals circuitry in the support circuit 114 to enter a low power mode. A number of power consuming circuits may be directed to a low power or standby mode of operation. Additionally, the signal from the power conservation module 122 may signal, or strobe, the receiver circuitry 103 to a low power mode to conserve power. In this way, when a correlated address is not enabled, as indicated by the associated status information, the selective call receiver 100 may conserve power immediately, while not decoding an associated message and also not storing the message in message memory 106. Of course, the power conservation module 122 will re-enable the receiver and other circuits at some later time. Methods of power conservation strobing in selective call receivers are known to those skilled in the art. However, the additional power conservation, by not decoding and storing message information that is associated with a correlated address information based on an enable status stored in the selective call receiver 100, provides significant advantages over conventional selective call receivers. Specifically, by not decoding and storing the message information the selective call receiver 100 can significantly conserve power. This is particular advantageous when the disabled address information is continuously and repeatedly received by the selective call receiver 100. Further, the controller 105

can inhibit any alerts to the user via the output annunciator 110. By not alerting, again power conservation is maximized. The status information 120, corresponding to each predetermined address information stored in the non-volatile memory 107, therefore, allows the controller 105 to disable functions in the selective call receiver 100, and to conserve power when a correlated address is determined disabled.

FIG. 2 illustrates an address and status table in the non-volatile memory 107, according to the preferred embodiment of the present invention. Status information is organized for each predetermined address information. The table comprises addresses 202, of which there are five 212, 222, 232, 242, 252, and status information corresponding to each of the addresses. The status information includes enable or disable status 204, and a function status 206 for each address. For example, the address 123457 212 has a disabled status information 214. Hence, when the address 123457 is detected by the address correlator 116 the message information will not be decoded, or stored in message memory 106, and no alert will be provided to the user. By disabling the address the user can avoid annoying and unwanted pages, and also conserve power to extend the life of the battery 101.

A user can modify the function status 206 and the enable status 204 for each address in the selective call receiver 100. This user configurability is a significant advantage not available in known selective call receivers. Some examples of user configuration are illustrated in the address status table. For example, the second address 222, i.e., address 123458, in the address status table has an enable status 224, and an audible 226 alert type. That is, when the address correlator 116 detects the address 123458, the message decoder 114 will decode the message information associated with the correlated address and the function controller 118 will store the message in the message memory 106. Further, the controller 105 will

alert the user via an audible alert. For the third address 232 in the address status table, the address is enabled 234 and a silent alert 236 will alert the user that a message associated with the address was received. The fourth address 242 in the address status table has an enable status 244 with the function being a null function 246. This status configuration allows the selective call receiver 100 to decode the associated message and store the message in message memory 106, while not alerting the user. Hence, the message is received and stored into memory 106, while the user is spared any type of annoying alert. At some future time the user would query the selective call receiver 100, such as via the input controls 112 and the display 108, and review any previously received messages, without having been alerted at the time of their reception. This null alerting function can be configured on a per address basis, which is a feature not available in known pagers.

Furthermore, the function status 206 for each address 202 may indicate a message destination 256, as shown for the fifth address 252 in the address and status table. For address 123455 in the table, a received and decoded message will be forwarded to the computer interface 124, as indicated by the status 256 in the table. Other possible combinations of function status 206 will be appreciated by the skilled artisan.

Additionally, other function status 206 may be provided for the user's convenience. For example, the cadence of the alert for each predetermined address may be configurable in the status table. Also, a time delay alert may be configured for a predetermined address, normally requiring a timer module (not shown) in the selective call receiver 100. Each address could be individually configured to a time delay alert after detection of the address. In this way, the user is alerted by the selective call receiver 100, but after a user configurable time delay. The time delay can be

selected by the user to avoid a time interval where the user does not want to be bothered. Also, a secure mode function status 206 may be configured for specific addresses that communicate messages to the optional computer interface 124. In the secure mode, the selective call receiver 100 would receive, decode, and store messages into message memory 106, but would not alert or provide any communication to the computer interface 124. The user would have to access the selective call receiver 100 and identify himself via a password feature. Hence, messages received in the secure mode would be password protected. This feature also could be configurable on a per address basis.

FIGs. 3, 4, and 5 constitute a flow diagram for configuring the status information 120 for the selective call receiver 100, in accordance with an embodiment of the present invention. Preferably, a user can configure status information 120 for individual predetermined addresses that are stored in the non-volatile memory 107, via user input controls 112. The selective call receiver 100 can prompt a user via the display 108 and accept inputs from the user via the input controls 112, such as via buttons or switches. Alternatively, the status configuration may be effected via the optional computer interface 124, using computer communication with an external computer. Hence, whichever means of interfacing with the selective call receiver 100, by allowing the user to configure status information on a per address basis, the present invention provides significant advantages that are not available in conventional selective call receivers today.

FIG. 3 shows the basic user configuration sequence for the function controller 118. Upon entering the user configuration mode 302, the function controller 118 first determines the predetermined address 304 that a user wishes to configure, and then gets the status information 306 from the user. Upon exiting the user configuration

mode 308, the changes made by the user to the status information 100 are used by the selective call receiver 100 during normal operation.

FIG. 4 illustrates the get pager address 304 sequence. After initializing and getting a first pager address from the address status table 120, the function controller 118 prompts 404 the user with the first pager address to be configured. The user can select 406 the particular pager address, or pager number, such as by entering a user input 122. If the user has not selected the currently displayed pager number 406 and has not aborted 408 the current configuration mode, then a user input detection causes the function controller 118 to advance to the next pager address 410 in the table 120 and then to prompt 404 the user with the particular pager number. In this sequence 404, 406, 408, 410, the function controller 118 keeps prompting the user with each subsequent predetermined address that is stored in the non-volatile memory 107. This prompting can continue in a circular fashion until the user either aborts 408 the user configuration function, by entering a particular user input via the input controls 112, or by selecting 406 the currently displayed pager address, which then saves 414 the selected pager address and then causes the function controller 118 get 306 the status information to be configured for the selected address.

FIG. 5 illustrates the status information configuration sequence. Once the address has been selected by the user, the function controller 118 then prompts 502 the user to determine the enable/disable status for that address. If the user selects 504 the enable status, then the status information for that address will be set 506 to enable. Alternatively, another user selection would set 508 the status information for that address to a disable status 508. Next, the function controller 118 prompts 510 the user for the type of alert to configure for the particular address. In the preferred

mode, the user can select from at least one of an audible alert, a silent alert, a visual alert, or optionally a null alert, which provides no alert to the user. Once the alert type has been selected 512, the function controller 118 then sets 514 the appropriate function status for the selected pager address in the non-volatile memory 107. Hence, a type of alert can be configured by the user on a per address basis for the selective call receiver 100.

Subsequently, the function controller 118 may prompt 516 for a message destination. If the user selects 518 a message destination being the optional computer interface then the function controller 118 will set 520 the appropriate status information for the particular address selected. Alternatively, the user can select 521 no computer interface for message destination. In this way, the message received will not be communicated to an external computer or other device via the computer interface 124. Once the status information has been configured 522 for the particular address selected, the function controller 118 exits 308 the configuration mode and returns the selective call receiver 100 to normal operation.

FIG. 6 is a flow diagram illustrating an operational sequence for the selective call receiver 100, according to an embodiment of the present invention. During normal operation, the selective call receiver 100 may determine that a received RF signal includes address information to be decoded. Then, the address correlator 116 may be invoked 602, 604, to decode the address information , to determine if the address information correlates with one of the predetermine addresses stored in the non-volatile memory 107. If the received and decoded address does not match one of the predetermined addresses 606 then the selective call receiver 100 can immediately begin to conserve battery power 608, 610. However, if the received address information matches or correlates the predetermined address information stored in the non-

volatile memory 107, then the function controller 118 determines 612 if the correlated address is enabled for the selective call receiver 100. If not enabled, the selective call receiver 100 can immediately begin to conserve battery power 608, 610. If the correlating address is enabled, the message decoder 114 then decodes the message information associated with the correlated address, and the function controller 118 then stores the decoded message information 614 into the message memory 106. Subsequently, the function controller 118 determines the alert type from the status information 120. If the alert type is a null alert then no alert is presented to the user. Whatever the alert type stored in the status information for the correlated address, an alert corresponding thereto is presented to the user 616. A null alert type presents no alert to the user. Lastly, in the preferred embodiment, if the message destination is the computer interface 618 then the message information is routed to the optional computer interface 620, and computer communicated to an external computer or other device. Once the controller 105 is done with the current message 610, it may execute other functions or immediately go to conserve battery power 608 as determined by the controller 105.

In this operational sequence, the selective call receiver 100 can respond to the status information configured by the user, thereby providing additional convenience and control to the user. That is, the user can configure a number of functions for the selective call receiver 100 on a per address basis. Thus, this selective call receiver 100 allows the user to selectively enable and disable addresses and functions in the selective call receiver 100, which provides significant advantages to the user over contemporary selective call receivers.

What is claimed is:

CLAIMS

1. A selective call receiver comprising:

receiving means for receiving address information and associated message information;

address memory means for storing at least one predetermined address and associated status information comprising an enabled or disabled address status;

address correlating means, coupled to the receiving means and the address memory means, for correlating the received address information to the at least one predetermined address;

status determining means, coupled to the address correlating means and the address memory means, for determining from the status information associated with the at least one predetermined address that correlated with the received address information whether a status of the received address information is an enabled or disabled address status; and

message decoding means, coupled to the status determining means and the receiving means, for decoding the associated message information when the status of the received address information is enabled, and for not decoding the associated message information when the status of the received address information is disabled.

2. The selective call receiver of claim 1, further comprising user input control means coupled to the address memory means for user selectively modifying the status information associated with the at least one predetermined address.

3. The selective call receiver of claim 1, further comprising computer interface means coupled to the address memory means for selectively modifying the status information associated with the at least one predetermined address by using computer communication via the computer interface means.

4. The selective call receiver of claim 1, further comprising message memory means coupled to the status determining means and message decoding means for storing the decoded message information in response to the received address information having correlated to the at least one predetermined address, where the at least one predetermined address has an enabled address status.

5. The selective call receiver of claim 1, further comprising computer interface means, coupled to the message decoding means and status determining means, for selectively communicating the decoded message information by using computer communication via the computer interface means in response to the received address information having correlated to the at least one predetermined address, where the at least one predetermined address has a message destination status directed to the computer interface.

6. The selective call receiver of claim 1, further comprising alerting means coupled to the status determining means for providing an alert in response to correlating the received address information to the at least one predetermined address, where the at least one predetermined address has an enabled address status.

7. The selective call receiver of claim 6, wherein the status information associated with the at least one predetermined address further comprises alert type status and the alerting means provides an alert corresponding to the alert type status.

8. The selective call receiver of claim 6, wherein the alert type status, and the alert corresponding thereto, comprises at least one of a set of types of alerts including audible, silent, visual, and null.

9. A method for conserving power in a selective call receiver, the method comprising the steps of:

(a) storing at least one predetermined address and associated status information, the status information at least indicating an enabled or disabled address status;

(b) receiving address information;

(c) correlating the received address information to a predetermined address;

(d) determining a status of the received address information, if the received address information correlated to the predetermined address;

(e) receiving and decoding message information associated with the received address information when the determined status of the received address information indicates an enabled address status; and

(f) inhibiting the decoding of the message information and conserving power in the selective call receiver when the determined status of the received address information indicates a disabled address status.

10. The method of claim 9, further comprising the step of:

(g) user selectively modifying the status information associated with the at least one predetermined address.

11. The method of claim 9, further comprising the step of:

(h) storing the received and decoded message information when the determined status of the received address information indicates an enabled address status.

12. The method of claim 9, wherein the status information further indicates a message destination status, the method further comprising the step of:

(i) computer communicating the stored message information via a computer interface when the determined status of the received address information indicates an enabled address status and the message destination status indicates a computer interface destination.

13. The method of claim 9, wherein the status information further indicates an alert type status, the method further comprising the step of:

(j) providing an alert in response to receiving and decoding the message information when the determined status of the received address information indicates an enabled address status, the alert corresponding to the alert type status of the determined status of the received address information.

14. A selective call receiver for receiving messages in a multi-recipient message paging system, the selective call receiver comprising:

a receiver for receiving messages, each message including address information and message information;

an address memory for storing at least one predetermined address and associated status information comprising an enabled or disabled address status;

an address correlator, coupled to the receiver and the address memory, for correlating the received address information to the at least one predetermined address;

status determining means, coupled to the address correlator and the address memory, for determining from the status information associated with the at least one predetermined address that correlated with the received address information whether a status of the received

address information is an enabled or disabled address status;

message decoding means, coupled to the status determining means and the receiver, for decoding the associated message information when the status of the received address information is enabled, and for not decoding the associated message information when the status of the received address information is disabled; and

a message memory for storing the decoded message information.

15. The selective call receiver of claim 14, further comprising user input control means coupled to the address memory for user selectively modifying the status information associated with the at least one predetermined address.

16. The selective call receiver of claim 14, further comprising alerting means coupled to the status determining means for providing an alert in response to correlating the received address information to the at least one predetermined address, where the at least one predetermined address has an enabled address status.

17. The selective call receiver of claim 16, wherein the status information associated with the at least one predetermined address further comprises alert type status and the alerting means provides an alert corresponding to the alert type status.

18. The selective call receiver of claim 16, wherein the alert type status, and the alert corresponding thereto, comprises at least one of a set of types of alerts including audible, silent, visual, and null.

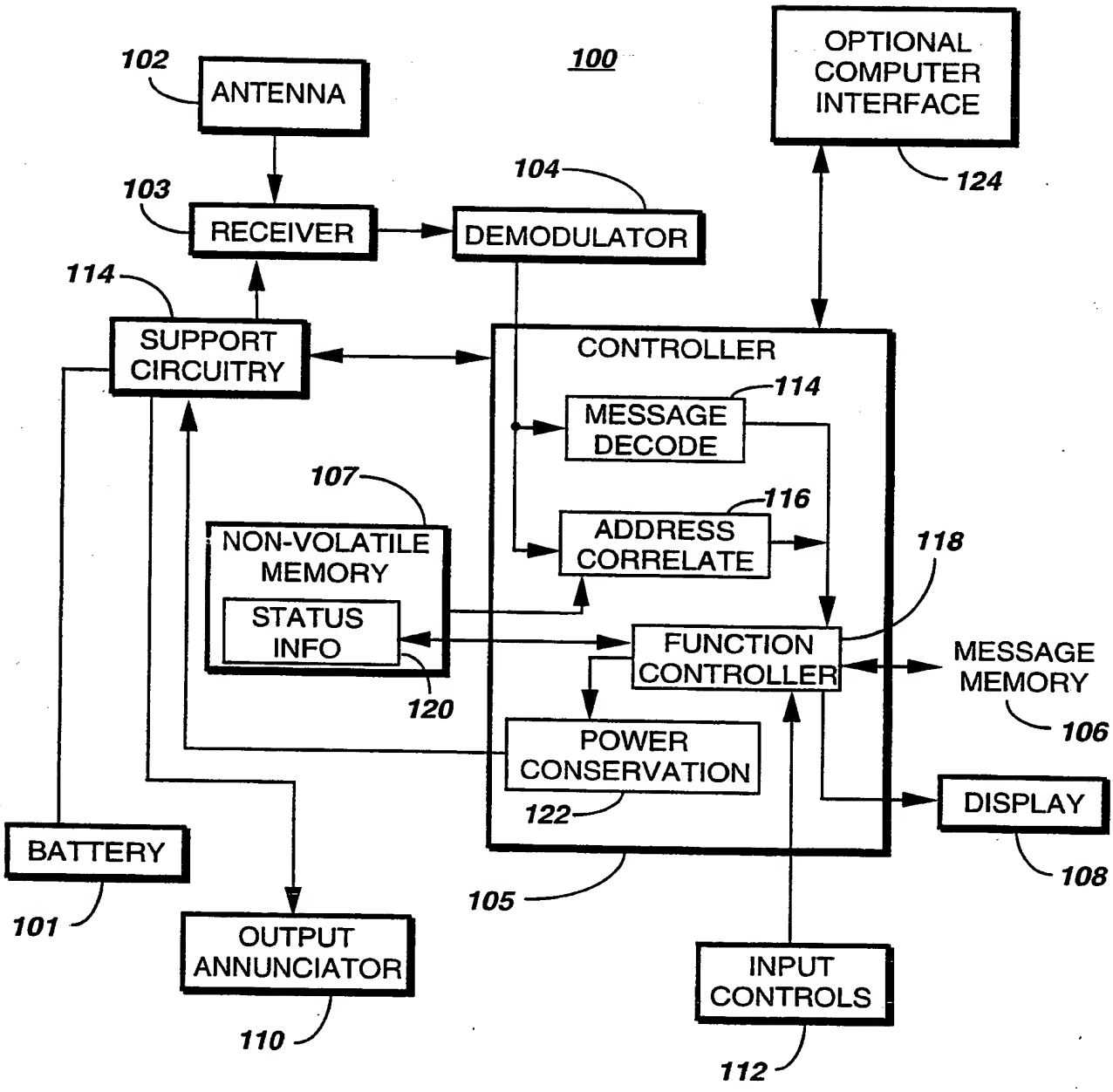
100
102
ANTENNA
103
RECEIVER
104
DEMODULATOR
OPTIONAL COMPUTER INTERFACE
124
114
SUPPORT CIRCUITRY
CONTROLLER
114
MESSAGE DECODE
107
NON-VOLATILE MEMORY
STATUS INFO
120
116
ADDRESS CORRELATE
118
FUNCTION CONTROLLER
MESSAGE MEMORY
106
POWER CONSERVATION
122
DISPLAY
108
BATTERY
101
OUTPUT ANNUNCIATOR
110
105
INPUT CONTROLS
112

FIG. 1

120

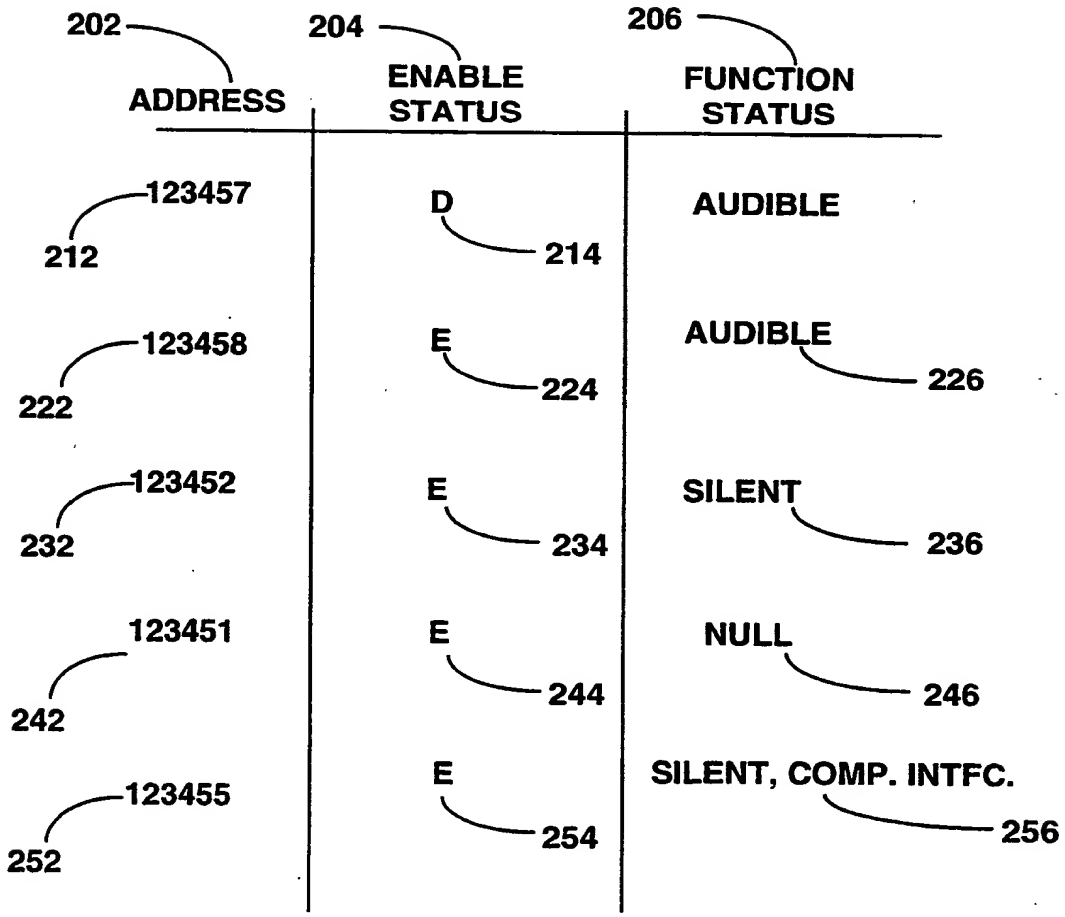

FIG. 2

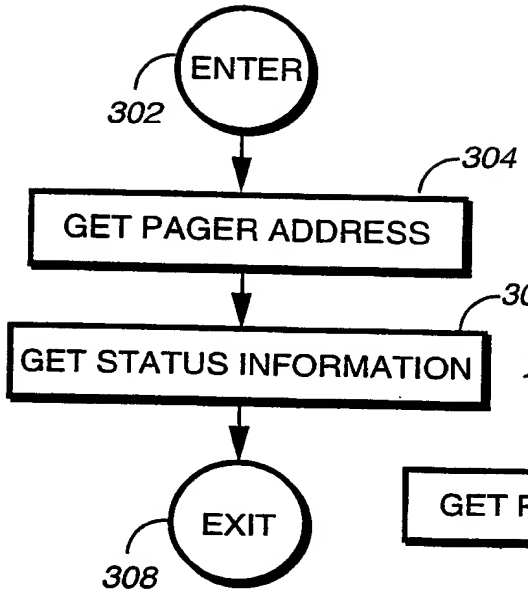

FIG. 3

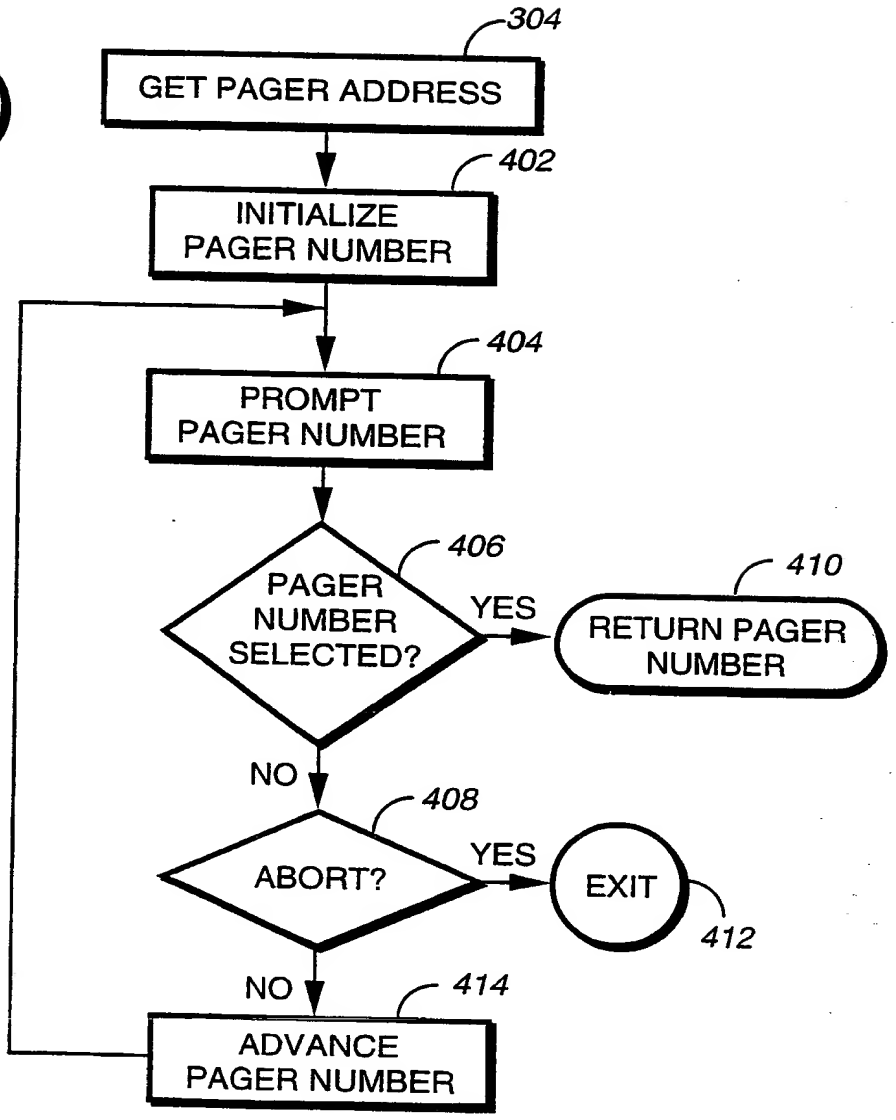

FIG. 4

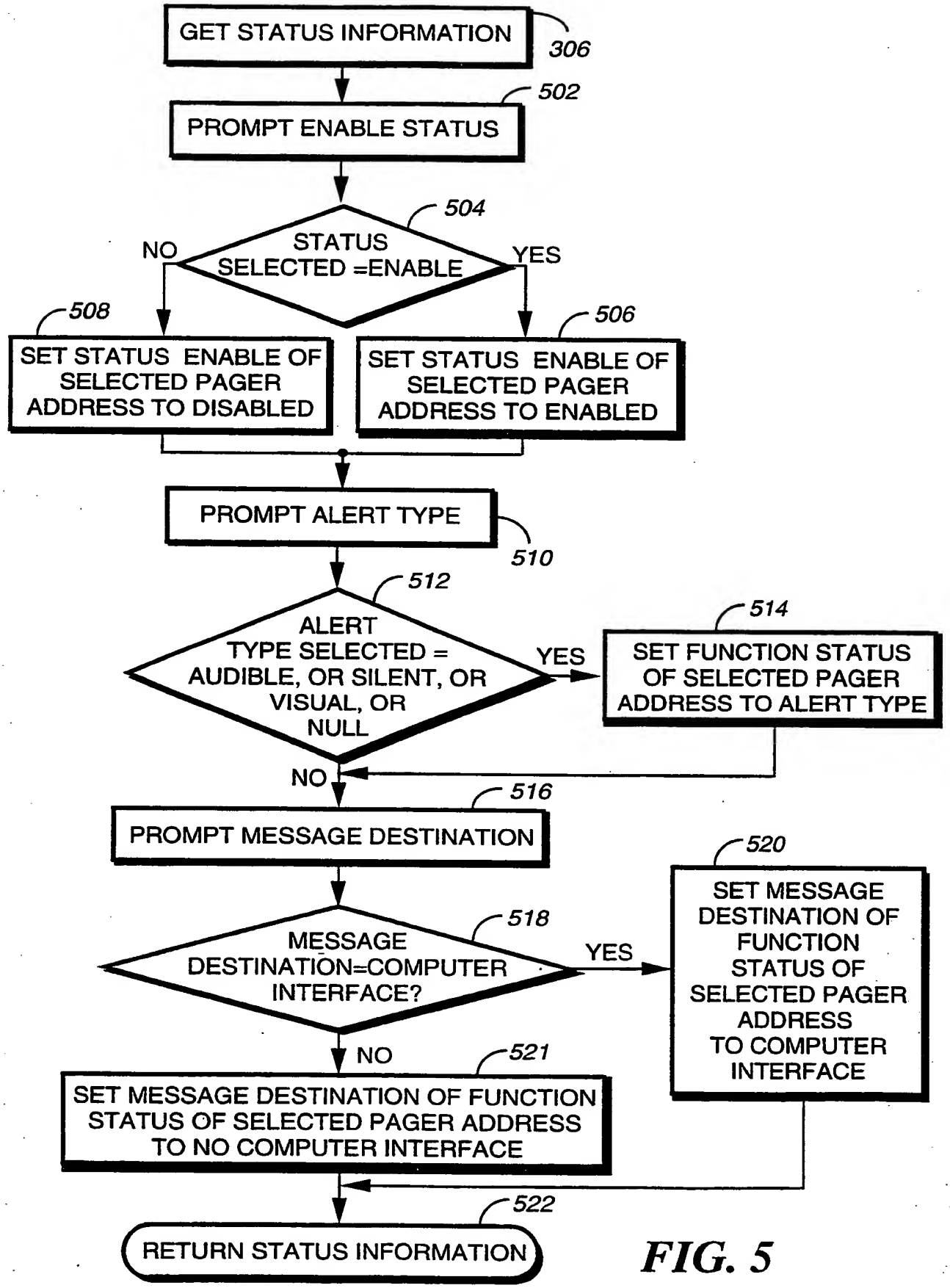

FIG. 5

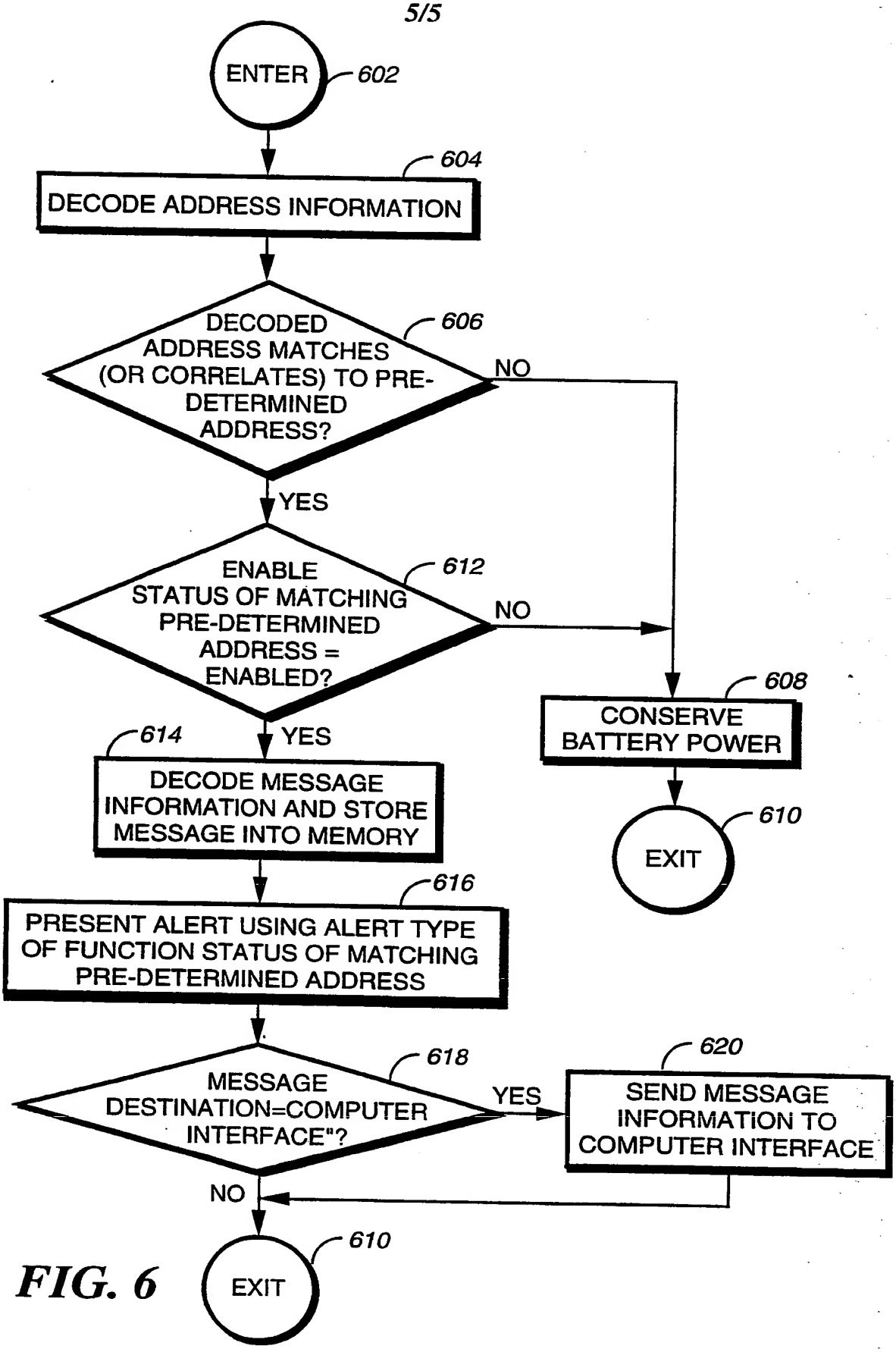
ENTER
602
DECODE ADDRESS INFORMATION
604
DECODED ADDRESS MATCHES (OR CORRELATES) TO PRE-DETERMINED ADDRESS?
606
NO
YES
ENABLE STATUS OF MATCHING PRE-DETERMINED ADDRESS = ENABLED?
612
NO
YES
CONSERVE BATTERY POWER
608
EXIT
610
DECODE MESSAGE INFORMATION AND STORE MESSAGE INTO MEMORY
614
PRESENT ALERT USING ALERT TYPE OF FUNCTION STATUS OF MATCHING PRE-DETERMINED ADDRESS
616
MESSAGE DESTINATION=COMPUTER INTERFACE"?
618
YES
SEND MESSAGE INFORMATION TO COMPUTER INTERFACE
620
NO
EXIT
610

FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US92/10827

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) :H04Q 7/02
US CL :340/825.440

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 340/825.45,825.46,825.47,825.48,311.1

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US,A, 4,894,649 (DAVIS) 16 JANUARY 1990 See figures 1,3a,3b; col. 1, lines 15-25; col. 2, lines 1-9; col. 4, lines 27-59;col. 5, lines 15-30; col. 5, line 57 through col. 6, line 14; col. 7, lines 25-38.	1-2,4,6-11,13-18 3,5,12
Y	US,A, 4,984,295 (ENGSTROM ET AL) 08 JANUARY 1991 See col. 2, lines 11-29; col. 4, lines 45-56; Figures 2,6.	3,5,12
Y	US,A, 5,043,721 (MAY) 27 AUGUST 1991 See abstract figure 1, col, 2, line 66 through col. 3, line 9.	3,5,12

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be part of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 MARCH 1993	13 APR 1993
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. NOT APPLICABLE	Authorized officer JOHN GILIST Telephone No. (703) 305-4859

Form PCT/ISA/210 (second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US92/10827

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US,A, 4,975,693 (DAVIS ET AL0 04 DECEMBER 1990 See col. 2, lines 11-29,55-65; col. 3, lines 35-45; figure 1.	6-8,13,16-18